AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 102

THE FAIREY III.F (BRITISH)

A General-Purpose Biplane

Washington
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THE FAIREY III.F (BRITISH)*

A General-Purpose Biplane.

The Fairey III.F is the latest production of the Fairey Aviation Company, Ltd., of England. It is convertible from landplane to seaplane and will serve as a fighter, bomber, reconnaissance, ambulance, passenger, or long-range airplane. It is of rustproof metal construction, with folding wings and a robust Oleo landing gear (Figs. 1, 2 and 3).

In common with other Fairey aircraft, the III.F makes use of a stiff tubular metal center cellule forming the structure to which are attached the detachable welded tube engine mounting to the front, and to the rear, the after portion of the fuselage. The upper main wings are attached to each side of the top center plane which forms the upper part of the center cellule, the lower wings and landing gear being mounted on the lower spar "spools" of the same cellule. The cellule is formed by transverse tubular steel spars fitted at their extremities with metal spools, to which are attached the tubular struts and bracing wires forming the structure (Figures 4, 5, and 6). This form of construction is extremely robust and produces a rigidity that overcomes any tendency for distortion, such as

*From a circular issued by The Fairey Aviation Company, Limited, England.

might occur, for instance, during the process of folding the main wings or beaching on an uneven shore when used as a seaplane.

Power Plant.- The engine mounting is made entirely of welded steel tubes and is of similar form in all type III.F's, but the varying sizes of different types of engines necessitate in some cases engine mountings of different dimensions (Fig. 7).

The standard III.F is fitted with either a Napier "Lion" series V engine having a compression ratio of 5.8 to 1, or a Napier "Lion" series XI with 6 to 1 compression ratio, or with the new Rolls-Royce F.XII, all of which are water-cooled engines; if an air-cooled engine is preferred, the Bristol "Jupiter" series VIII is used. Besides these engines, however, there are various other engines of between 450 and 600 hp that can also be installed.

Engine starting is by means of a hand crank situated on each side of the fuselage or, if required, alternative means of starting can be provided by gas or impulse starter.

An extremely simple fuel system is incorporated, consisting of an engine-driven gasoline pump, delivering fuel to the carburetors through a special design of hand pump, which can be operated instantly by the pilot should the necessity arise.

The normal fuel capacity (without wing "bomb" tanks) is 124 gallons, or 563 liters, of gasoline and the amount of oil which can be carried is 9 gallons, or 41 liters, giving a range

at cruising speed of about 700 miles (1130 kilometers).

Wings.- In the metal wing used, the spars are of corrugated drawn tube of the section known as "double eight," with pressed ribs clipped thereto. By anodic treatment and cadmium plating respectively, all aluminum alloy and steel parts and fittings are rendered proof against corrosion through atmospheric or other conditions. Fairey patent variable camber gear is fitted to all III.F wings in addition to the usual aileron controls, and enables a lower landing speed to be obtained together with increased control at speeds below that of stalling. By means of handholes fitted to the wing covering, all control pulleys, fairleads and internal bracing, are readily accessible for inspection. The main wings can be folded with ease (Fig. 8), in which case the width of the airplane is reduced to only 14 ft. $3\frac{1}{2}$ in. (4.36 meters).

A detachable sling is fitted to the upper center wing, where it is normally concealed. The pilot and observer both have easy access to this fitting (Fig. 9).

Tail Unit.- The stabilizer and elevator follow the general practice of the main wings, being constructed of metal throughout (Figs. 10 and 11). The angle of incidence is adjustable by the pilot during flight.

The fin and rudder are constructed of steel tubing and can be readily repaired or replaced.

Landing Gear.- The land type landing gear is of steel tube construction incorporating the Fairey patent Oleo shock-absorbing legs, a feature of which being that they have adjustable damping control to suit local conditions. This landing gear is extremely robust and capable of withstanding very rough usage. The standard seaplane landing gear consists of tubular steel with special shock-absorbing legs fitted to the rear booms, to which is fitted a pair of duralumin floats complete with water rudders, operated at will by the flying rudder pedals. The capacity of the floats is about 190 cubic feet each.

Cockpits.- The pilot is situated aft of the top wing rear spar, where he has an excellent field of view in all directions. His flying controls are of the "stick" or column type for the ailerons and elevators, with adjustable pedals for the rudder. On the left-hand side of the pilot's seat is a small lever which adjusts the tension of the spring of the rudder trimming gear.

The pilot's seat on the standard III.F is designed to be adjustable for height, and is deep enough to take a seat type parachute if desired.

Controls.- By means of cam quadrants all flying controls are arranged to allow at maximum operation an increased movement of the pilot's control relative to the control surfaces. The variable camber and the adjustable tail incidence are controlled by means of hand wheels within easy reach of the pilot. Immedi-

ately behind the pilot is placed the gunner's or observer's cockpit. In the general-purpose type, the cockpits are arranged as a two-seater and the fleet air arm as a three-seater; the equipment and arrangement of both are described later in detail.

Owing to the proximity of the pilot's and observer's cockpits, the closest cooperation is assured and communication can be maintained with ease.

Corrosion Proofing.- All metal parts are suitably protected against atmospheric corrosion, ferrous parts are sand-blasted, then electrolytically treated, and finally coated with cellulose paint which is air-sprayed; nonferrous parts such as duralumin, are anodically treated and varnished, affording ample protection against corrosion.

Pilot's Cockpit.- The pilot has at his service a complete set of instruments covering all requirements. Provision is made for a safety belt and also for oxygen, as three cylinders can be installed beneath the pilot's seat. The cockpit hooding comes well up and affords good protection to the pilot, while the beading of the cockpit opening is carefully padded.

The pilot's windshield is made of triplex glass inserted in an exceptionally rigid cast aluminum frame and gives a very clear view and ample protection.

Rear Cockpit.- The rear cockpits of the two- and three-seat III.F aircraft are very similar, the amount of stowage

space and floor area available being relatively the same in both cases, but the cockpit openings and hooding are, of course, of different dimensions. With the three-seater, the rear gun mounting is situated in the same position, but the cockpit hooding is open farther aft, and an additional seat is provided for the wireless operator, who remains between the gunner and the pilot, whereas with the two-seater, the rear cockpit opening accommodates the gunner and the gun mounting alone, and a seat for the gunner only is fitted.

Instruments (Rear Cockpit).- Dividing the rear cockpit from that of the pilot in both the two- and three-seat types is a metal partition or bulkhead in the lower portion of which, on the port side, are mounted the air-speed indicator, altimeter and watch, an arrangement which allows an easy reading to be taken by the occupant of the rear cockpit when lying in a prone position for the purpose of sighting for bomb dropping. The bomb sight is arranged to be mounted on side of the trap door opening, the trap door itself hinging back and attaching, when open, to the cockpit bulkhead. Below the trapdoor in the fuselage fairing, a sliding panel is fitted which can be slid back when the trapdoor is opened. This overcomes the necessity of leaving an opening in the fuselage fairing when the trapdoor is closed, and so assists in maintaining the performance of the aircraft.

Radio.- All types of III.F aircraft are bonded for radio throughout, and every provision is made for the installation of the necessary apparatus of the Marconi A.D.6h or similar type. With the modified type of radio set as supplied to the British Air Ministry, it is possible to use the camera without withdrawing the radio installation.

Tapping keys are provided in both the pilot's and rear cockpits.

The radio generator is attached to a swinging arm mounted to the lower starboard side of the cockpit and is operated by means of a nonreversible worm gear which swings the generator from its stowage position within the cockpit to its outward/in position the air stream (Fig. 6). A sliding panel is provided in the fuselage covering in order to allow the operation of the generator and its supporting arm.

Armament - Guns.- In both the two- and three-seat III.F aircraft the guns carried are the same, namely, one belt-fed gun firing forward, operated by the pilot, and a rear gun of the drum-fed type under the charge of the gunner. The front gun is mounted on the port side of the cockpit at a centrally situated position between the longerons, and fires through a blast-channel let into the cowling. Being within the cockpit the gun is readily accessible to the pilot for the purpose of clearing jambs, etc. The usual gun trigger is fitted to the flying control column while the gun sights, which may be of the ring and bead

type or of the "Aldis" type as required, are mounted upon the upper fuselage hooding immediately in front of the pilot's line of vision. An ammunition box holding 600 rounds is mounted in front of the pilot, and is quickly detachable for refilling.

The rear gun mounting may be either of the Scarff ring pattern or the Fairey new type gun mounting which has been specially designed to meet the requirements arising from the increased performance and maneuverability of modern aircraft.

In a convenient position upon each side of the cockpit floor are provided folding firing steps or platforms in order to allow the gunner to obtain a higher firing position should he so desire. When not in use these steps fold away and do not encroach on the cockpit space.

Bomb Gear.- Fairey III.F aircraft are arranged to take various bomb loads as standard equipment; for instance, a total of two 230-pound or 250-pound bombs and four sighter bombs, or four 112-pound bombs and four sighter bombs may be carried if desired, or two racks of 4 × 20-pound bombs alone can be used, but other arrangements can conveniently be carried out. All bombs are carried out under the main wings.

G e n e r a l

Full provision can be made for the installation of reconnaissance and navigation lights, the generator being mounted on the leading edge of the top center plane.

Wing tip flares can be fitted to the main wings of all types of III.F aircraft.

When the III.F is being used for naval purposes which entail a considerable flying over the sea, and the airplane is equipped with wheel landing gear only, it is sometimes desired to carry air-bags. A full set of these bags can be installed in the rear portion of the fuselage and, with fuel tanks empty (via jettison valve), this combined flotation gear will keep the airplane afloat for a considerable length of time (Fig. 12).

General Design and Construction

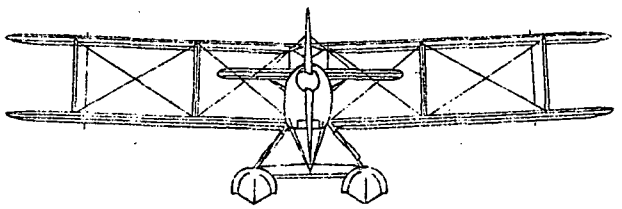
D i m e n s i o n s

With Napier Lion engine

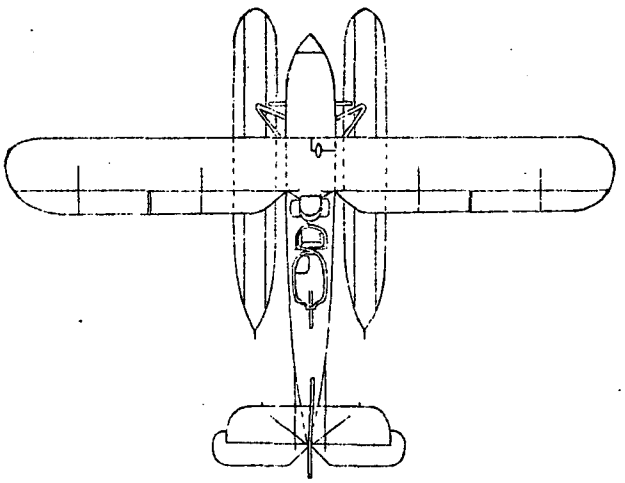
	Airplane	Seaplane
Span	45 ft. 9 in. (13.9 m)	45 ft. 9 in. (13.9 m)
Length, over-all	32 " 6 " (10.0 ")	36 " 8 " (11.2 ")
Height	11 " 6 " (3.5 ")	12 " 4 " (3.8 ")
Width, folded	14 " 3.5 " (4.4 ")	14 " 6 " (4.4 ")

With Rolls-Royce F.12 engine

	Airplane	Seaplane
Span	45 ft. 9 in. (13.9 m)	45 ft. 9 in. (13.9 m)
Length, over-all	35 " 3 " (10.75 ")	36 " 8 " (11.2 ")
Height	11 " 6 " (3.5 ")	12 " 5.5 " (3.8 ")
Width, folded	14 " 3.5 " (4.36 ")	14 " 3.5 " (4.36 ")



Span	45 ft.9 in.
Length overall	36 ft.8 in.
Height	12 ft.4 in.



Napier "Lion" engine.

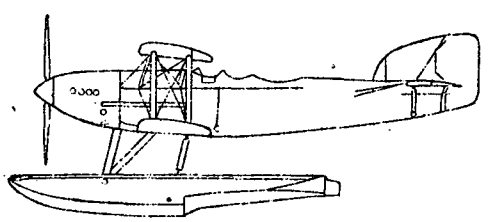


Fig.1 The Fairey IIIF seaplane.

Fig.2 The Fairey III F two-seater general purpose type airplane with Napier "Lion" engine.

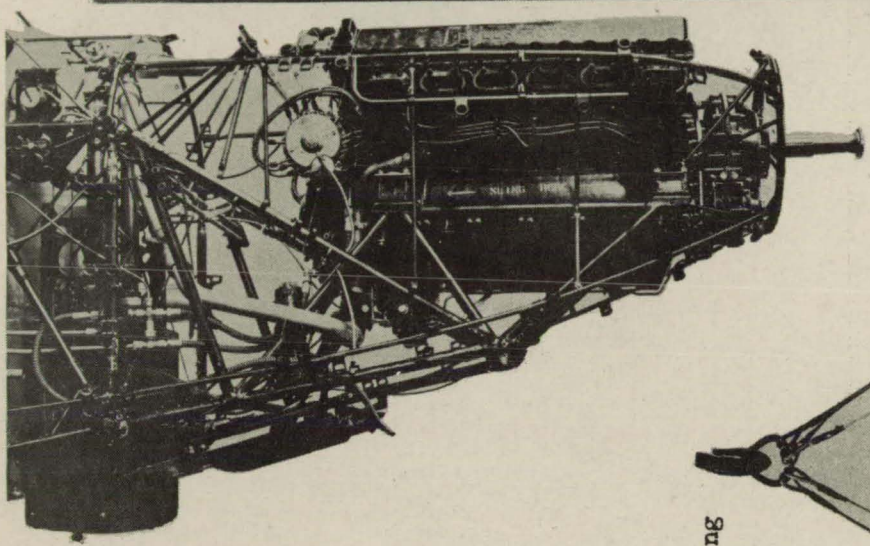


Fig.7 The welded engine mounting, oil cooler, retractable radiator and other installation features.

Fig.9 The hoisting sling. The cables are shown withdrawn and ready for use This devise can be used for hoisting complete airplane

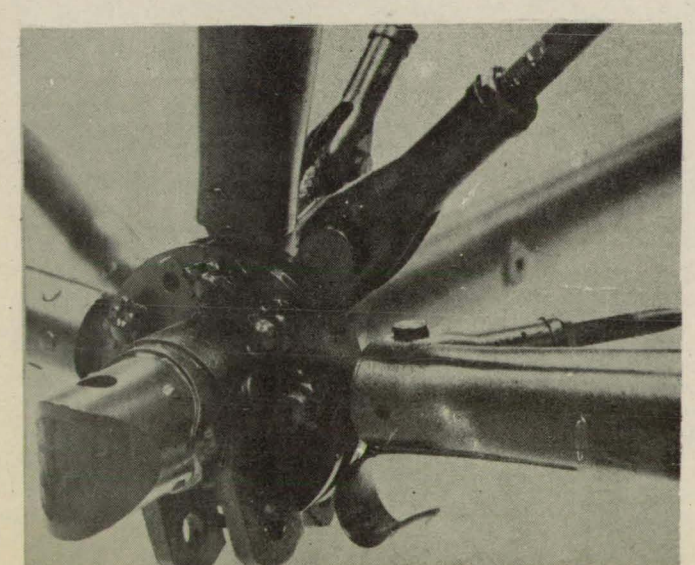


Fig.4 A typical Fairey spool joint.

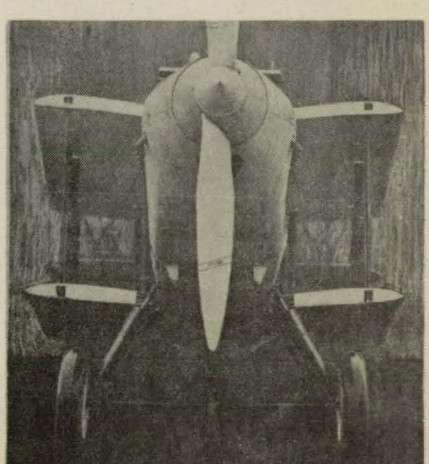


Fig.3 View showing the wings folded, III F.

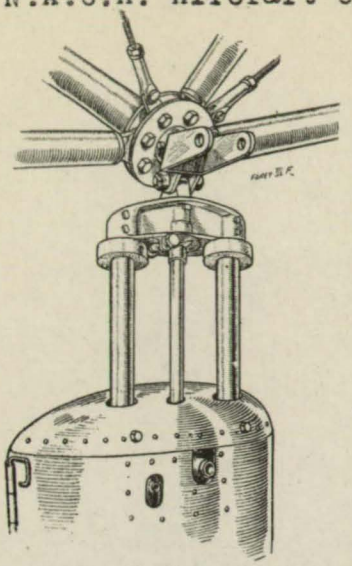


Fig.5 Fuselage "spool" wing root attachment and landing gear strut.

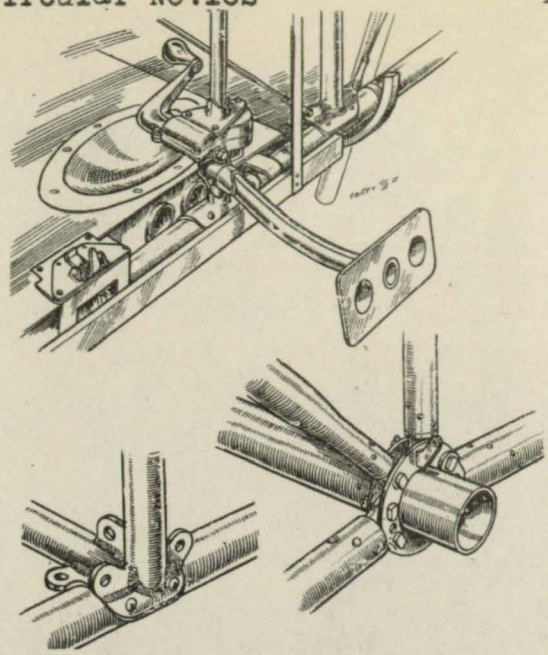


Fig.6 A swivelling bracket for the wireless generator. Below, welded and "spool" joints of the III F.

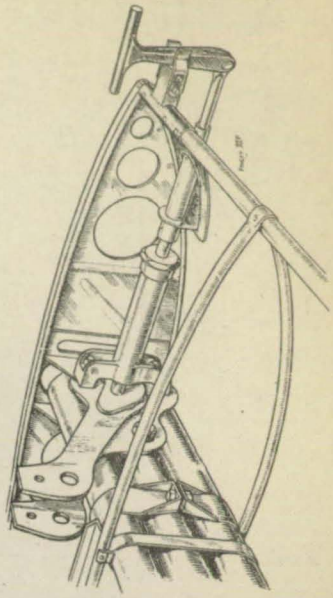


Fig.8 The locking pin arrangement for holding folded wings.

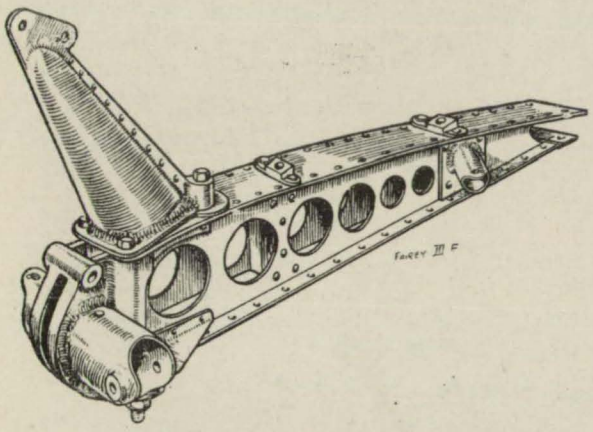


Fig.10 Aileron crank and rib of the III F airplane.

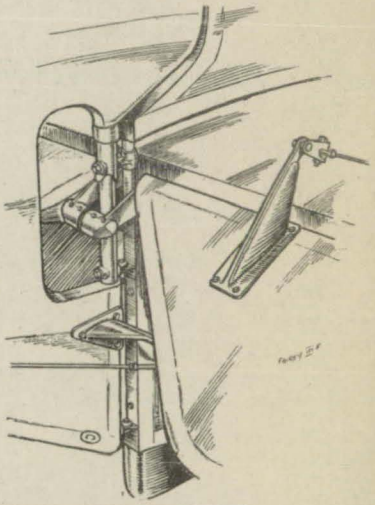


Fig.11 The elevators of the III F are joined.

Figures 5,6,8,10, and 11 reproduced from "Flight."

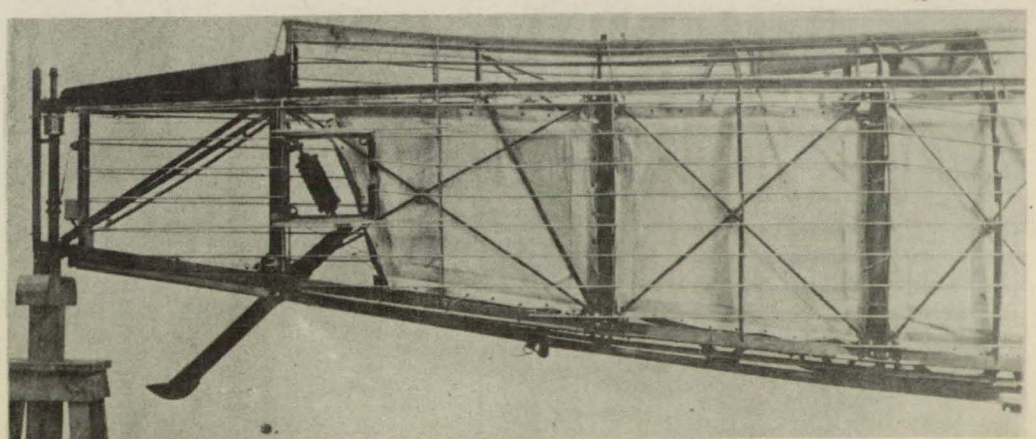


Fig.12 View showing air bags which will keep the III F airplane afloat for a considerable period.